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A STUDY OF TIME AND SEX DISTRIBUTION OF ROAD TRAFFIC ACCIDENT CASES IN WESTERN UTTAR PRADESH

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ABSTRACT

Introduction: Globalization has improved the socio-economic status resulting in more use of vehicles and this resulted in increased number of road traffic accident (RTA) cases. Objectives of the study were to study the gender difference in RTA cases and also to study the time distribution i.e. difference in occurrence of RTAs as per time of the day, day of the week and the various months of the year

Methods: A hospital based cross sectional study, conducted at Emergency department and Hospital of S.N. Medical College, Agra. Data were analyzed using SPSS software version 20.0.

Results: Out of total 425 RTA cases, majority were males (89.6%).About 7/10th cases (70.1%) occurred during weekdays). Overall, maximum cases (18.1%) occurred on Thursdays. According to time distribution trends 69.2% of accidents took place between 12.00 to 7.59 pm. Regarding months and season wise distribution, September had the maximum (12.0%) accidents and highest percentage (40.0%) of accidents occurred in rainy season. This seasonal variation was found to be highly statistically significant (P<0.0001).

Conclusion: Although accidents are uniformly distributed throughout the weekdays with slightly higher number of cases being reported on Thursdays and most of the accidents occurred during rush hours. Significantly higher number of accidents occurred in rainy season.

Key words: Road traffic accidents, seasonal trend, day and time distribution, Emergency department

INTRODUCTION

Spectacular advances in health and health related sciences has brought down the morbidity and mortality due to communicable diseases and has resulted in longevity of people. At the same time, globalization has improved the socio-economic status resulting in more use of vehicles and the travel, further resulting in increased number of RTAs .Thus the entire spectrum of non communicable diseases and accidents has come to the forefront of health care delivery system. Every year, road traffic injuries contribute to a significant number of deaths, hospitalizations (for short and long term), emergency care, disabilities, and amputations.

According to the Global Status Report of WHO on road safety 2013, worldwide the total number of

road traffic deaths remains unacceptably high at 1.24 million per year and 3400 people die on the world's roads every day. Tens of millions of people are injured or disabled every year. [1]In India, according to this report estimated road traffic deaths per lac is 18.9 and reported no. of total deaths were 130037 and maximum number of deaths (38.7%) occurred by unspecified vehicle followed by two/three wheeler (32.4%) vehicles.[2]

According to national crime records bureau 2013 maximum number of accidents occurred during May (43,064) followed by January (39,185) while least number of road accidents were reported in the month of August (33,698). On the basis of time hours maximum road accidents occurred during 1800 hrs to 2100 hrs (night) (78,981).[3]

Generally it was thought that during day time males are busy in their offices or where they work, while females after doing their work at home go for shopping or other works. So there chances of accident are increased during day time. On the other hand males are more prone to accident at morning hours and evening hours. So the present study was conducted to study the gender difference in RTA cases and also to study the time trends i.e. difference in occurrence of RTAs as per time of the day, day of the week and the various months/season of the year.

METHOD

The present study is a hospital based cross sectional study, conducted from April 2012 to March 2013 on cases admitted due to RTA in Emergency Department or Hospital of S.N. Medical College, Agra. The ethical clearance is given by ethical committee of S.N. Medical College, Agra .By using systematic sampling technique, a total of 425 RTA cases were included in the study. After obtaining informed and written consent, the cases or their attendants were interviewed by using a semi structured questionnaire. The Road traffic accident cases were operationally defined as "injuries occurring on road involving two or more objects, one of which was any kind of moving object" (WHO: World report 2004) .[4]

Cases / relatives who did not give written consent to participate in the study and cases who attended the Emergency Department between 5 PM to 8AM and were not admitted formally for treatment were excluded from the study.

The sample size was calculated by considering that 30% of admissions to the Emergency department were due to RTAs. [5] The 15% relative error at 95% confidence and 5% non-response error were considered for measurement of sample size by using following formula **Sample size (n) =** $\mathbf{Z^2_{\propto\%}\frac{pq}{D^2}}$**.** This gave a sample size of 425.

It was found out that in ED/Hospital of S.N. Medical College, Agra, the number of RTA cases admitted was approximately 1500 per annum, i.e. around 125 per month. In order to achieve the desired sample size (n=425), three visits on alternate days of week, between 8AM-5PM, were made to interview the cases or their attendants admitted on the day of visit. For first and third weeks of every month, the days selected were Monday, Wednesday and Friday while for second and fourth weeks of the month, the cases were interviewed on Tuesday, Thursday and Saturday.

Statistical analysis was done using SPSS version 20.0.The data were summarized using percentages and frequency. Significant difference was determined by using chi-square test and standard error of difference between two proportions. Difference was accepted significant at 0.05%.

RESULTS

Out of total 425 RTA cases, 381 were males and 44 were females (89.6% & 10.4% respectively) and this difference was statistically significant ($p< 0.00$).About seventy percent cases occurred during weekdays (Monday to Fridays) and rest thirty percent on weekend days (70.1% & 29.9% respectively) showing that in weekdays & weekend days the average percentages were 14% &15% respectively i.e. slightly more on weekend days. Almost same pattern was observed in two sexes with insignificant difference ($p> 0.4$). Overall maximum (18.1%) cases occurred on Thursdays while minimum on Wednesday and Friday (12.0% & 12.5% respectively) however the difference was statistically insignificant ($p>0.2$)**.** Similar day wise pattern was observed in males while in females maximum cases occurred on Saturday (27.3%) and least on Sunday (2.3%) and this gender wise difference was statistically significant ($p<0.02$) (table 1).

Table 1: Day wise distribution of RTA cases with gender

Days of week	Road traffic accident cases

	Male (n=381)	Female (n=44)	Total (n=425)	z value
Monday	50 (13.1%)	11 (25.0%)	61(14.3%)	1.62
Tuesday	52 (13.6%)	4 (9.1%)	56(13.2%)	0.97
Wednesday	48 (12.6%)	3 (6.8%)	51(12.0%)	1.39
Thursday	68 (17.8%)	9 (20.4%)	77(18.1%)	0.41
Friday	49 (12.9%)	4 (9.1%)	53(12.5%)	0.82
Saturday	53 (13.9%)	12 (27.3%)	65(15.3%)	1.94
Sunday	61 (16.1%)	1 (2.3%)	62(14.6%)	4.75
	χ^2=14.7 ;d.f. =6 ; p <0.02		χ2=7.6;d.f. =6; p<0.2	
Weekdays	267 (70.1%)	31 (70.5%)	298(70.1%)*	0.04
Weekend	114 (29.9%)	13 (29.5%)	127(29.9%) **	0.05
	χ^2=.075 ;d.f. =1 ; p <0.4			

*average 14.0% per week day, ** average 15.0 % per weekend day

Table 2: Distribution of RTA cases according time of the accident with gender

Time of the day	Road traffic accident cases			
	Male (n=381)	Female (n=44)	Total (n=425)	z value
04.00-07.59AM (Early morning)	20(5.2%)	6(13.6%)	26(6.1%)	1.58
08.00-11.59AM (Morning)	66(17.3%)	14(31.8%)	80(18.8%)	1.98
12.00-3.59 PM (Afternoon)	126(33.2%)	15(34.1%)	141(33.3%)	0.12
4.00-7.59PM (Evening)	144(37.8%)	9(20.5%)	153(36.0%)	2.62
8.00-11.59 PM (Night)	15(3.9%)	0(0.0%)	15(3.5%)	3.9
12.00-03.59 AM(Late night)	10(2.6%)	0(0.0%)	10(2.4%)	3.2
	χ^2=15.1; d.f. =5 ; p <0.01		(χ^2=290.65; d.f. =5; p<0.00)	

About 70.0% of accidents took place between 12 noon to 7.59 pm, out of which maximum (36.0%) occurred in evening hours followed by (33.3%) during afternoon while least (2.4%) cases occurred between 12 midnight to 3.59 pm. This difference in time wise distribution of RTA cases was found to be statistically highly significant (p>0.00). In males, a similar pattern was observed cases being 37.8% & 33.3% in evening & afternoon while in females maximum cases(34.1%) occurred in afternoon followed by 31.8% in morning hours and this gender wise difference was statistically significant (p<0.01) (table 2).

Table 3 on the months of occurrence of RTA cases shows that maximum accidents (12.0 %) occurred in September followed by August and October (10.5% & 9.9% respectively). Thus theses three months accounted for about 1/3rd cases. The accidents were comparatively fewer in November and December months (5.4% & 5.1% respectively). On computing the cases season wise, it was seen that maximum cases (40.0%) occurred in rainy season followed by summers (36.0%) and least in winter season (24.0%). This seasonal variation in RTA cases was found to be highly statistically significant (P<0.0001) (table 3).

Table 3: Month and season wise distribution of RTA cases (n=425)

	Road traffic accident cases	
	Number (n)	**Percent (%)**
Months		
January	26	6.1
February	31	7.4
March	40	9.5
April	32	7.5
May	41	9.6
June	40	9.4
July	32	7.5
August	45	10.5
September	51	12.0
October	42	9.9
November	23	5.4
December	22	5.1
Season*		
Summer	153	36.0
Rainy	170	40.0
Winter	102	24.0
χ^2=17.6 ; d.f. =2 ; p< 0.0001		

*summer (March to June), rainy season (July to October), winter (November to February)

DISCUSSION

The present study was conducted to know the time trend of occurrence of road traffic accidents and also to know the gender difference according to these factors. In this study it was found that 70.1% of cases occurred during weekdays. Similar pattern was observed in both males and females. Overall maximum (18.1%) accidents occurred on Thursdays and least on Wednesdays (12.0%).

Similarly among males maximum (17.8%) cases occurred on Thursday whereas in females it was on Saturday (27.3%). Similarly RK Singh et.al (2013) found that most accidents took place on weekdays and maximum on Thursdays (20.5%).[6] On the contrary Gudadinn et al (2007), P Bayan et.al (2013) and Jha N et.al (2004) in their study found that maximum accidents occurred on Sundays whereas least cases occurred on Thursdays.[7, 8, 9] These variations may be due to regional variation in traffic density patterns on certain days of the week in different cities.

On analyzing the occurrence of accidents according to time distribution of the day, it was found that maximum (69.2%) accidents occurred during rush hours (12am to 8pm) of which 36.0% occurred during evening (4 to 8 pm). Similar pattern was also seen in males but in females maximum (34.1%) cases occurred in afternoon (12 to 4 pm). J Patel et.al (2009) in Chhattisgarh, E Ravi Kiran et.al (2004) in Mangalore (Karnataka), PK Verma et.al (2004) in Delhi and MR Gudadinn et al (2007) also observed similar pattern i.e. maximum accidents occurred between 12- 8 pm.[10,11,13,7] From above studies it is clear that majority of accidents took place in peak hours (12- 8 pm) because these times coincide with the period when people are more active and mobile and there is increase in fatigue as the day progresses which leads to poor concentration and it predisposes individuals to the risk of RTAs.

In the present study month wise analysis showed that accidents were significantly more during September (12.0%), August (10.5%) and October (9.9%), while the accidents were least during the month of November (5.4%) and December (5.5%). Jha S et al (2010) found that the highest number of accidents took place in the month of June (11.7%).[12] Seasonal pattern showed that maximum number (40.0%) of the accidents took place in rainy season, followed by in summers (36.0%). Similarly E Ravi Kiran R et.al (2004) found that most accidents (48.5%) occurred in rainy season, followed by summer (33.5%). [11] Jha N et.al (2004) and PK Verma et.al (2004) also recorded similar seasonal trend.[9,13] All these information showed the general trend of increase accidents in the rainy season (peaking around August- Sept), then decline in winters.

CONCLUSION

Although accidents are uniformly distributed throughout the weekdays with slightly higher number of cases being reported on Thursdays, however on an average fewer cases occurred on weekend days. Most of the accidents occurred during rush hours both in males and females. Significantly higher number of accidents occurred in rainy season.

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